

Distribution System Of The Future

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Background

- This is a new effort to consider what future electric distribution systems might look like as the density of Distributed Generation increases.
 - Current plans suggest 20% of new generation by 2020.
 - Current designs, operating practices, planning techniques, and economic allocation schemes may not work effectively in the future.

Issues

- Current planning procedures probably will not be practically effective as the density of DG increases to the 20% level
- How should such future distribution systems be considered in the energy planning process
 - Part of the National generation-transmission mix ?
 - Independent entities capable of separating as needed ?
 - Something in between? But who has control and responsibility and liability ?
 - DG holds the promise of being a major resource in meeting future energy needs.
 - How can we accelerate its introduction and at the same time maintain, or increase, its potential value ?

Getting to the Value Potential

- One key to assuring the value of DG as an important future energy resource is to reconsider how we think about moving electricity from one place to another.
- Current planning and operating schemes are effective and have served the Nation well, but modifications are needed for high levels of DG penetration.
 - Time
 - Personnel
 - Study Cost
 - Changing electric power quality needs

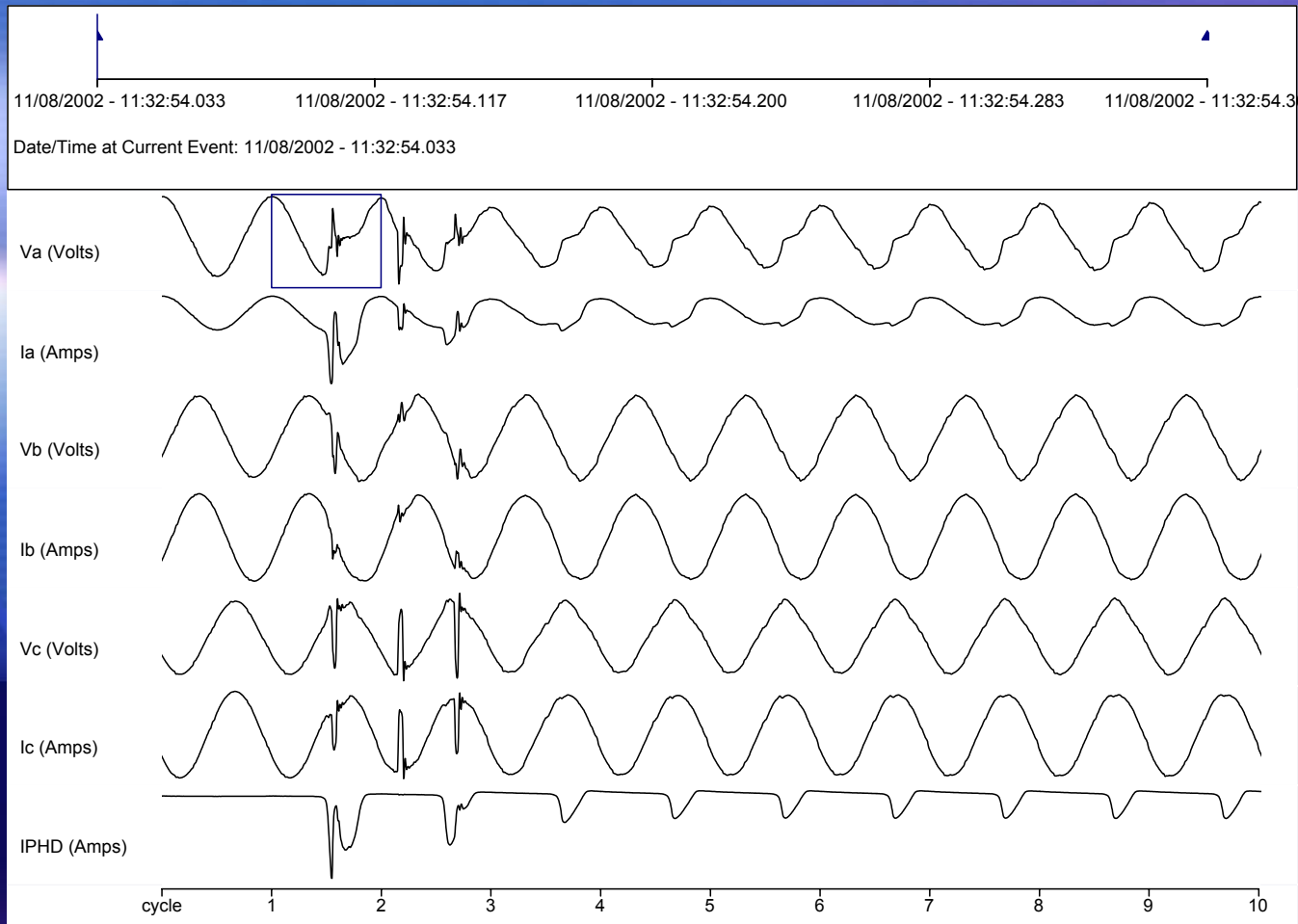
The End User Wants Low Cost, Reliability, and Power Quality

- The tools and procedures to quickly and economically analyze DG systems and their impacts on the macroscopic as well as local aspects of electric reliability and power quality may not exist.
- As the density of DG increases, it isn't clear how the responsibility for and the cost of needed infrastructure upgrades or additions will be handled.
- Will the traditional structure of generation feeding a transmission system that then supplies a radial distribution system make any sense in the future ?
- What about ancillary services ?

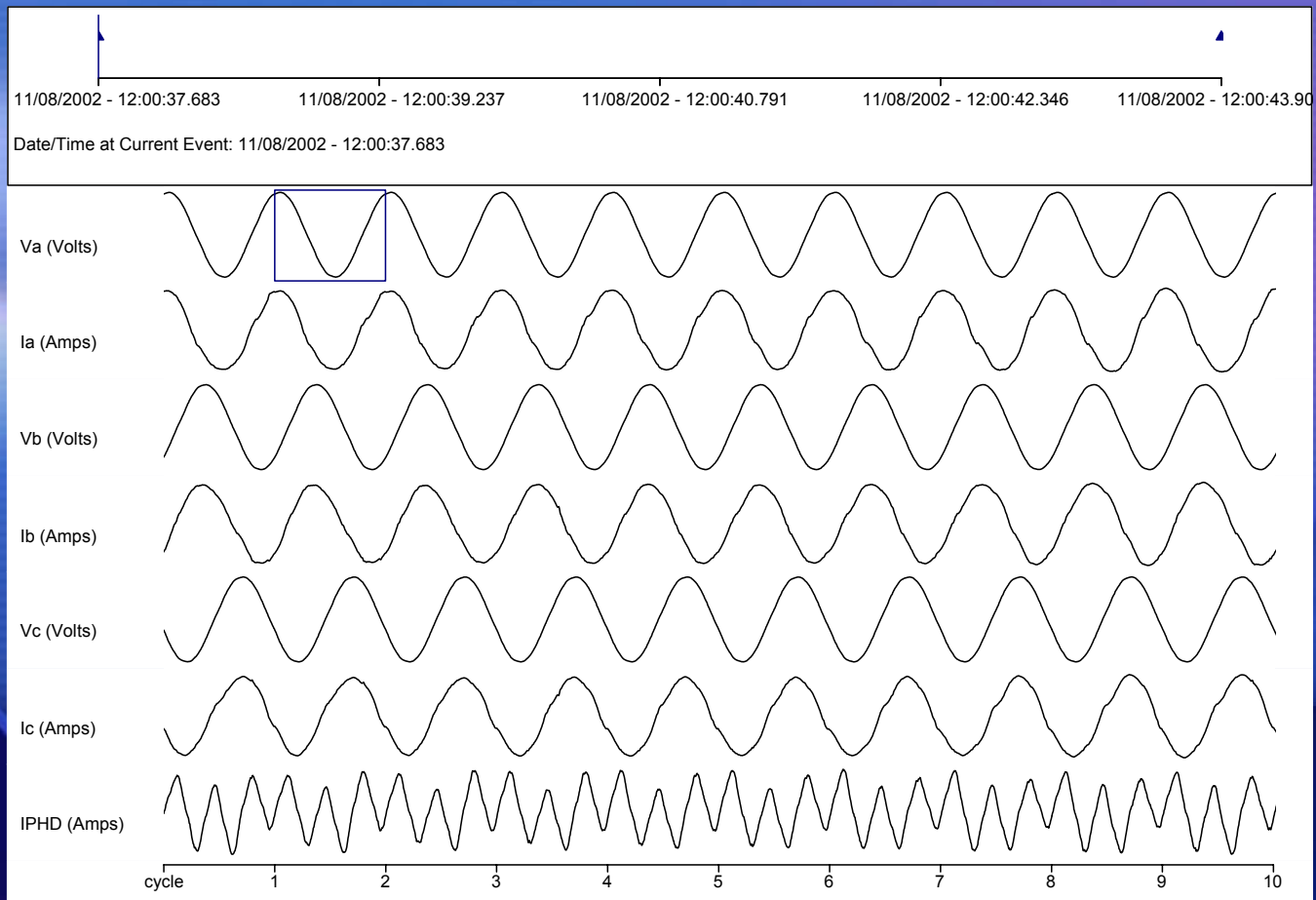
An Example Of An Issue

- Assume you want to power several loads with a DG.
 - Should you separate from the grid or stay connected and pay a backup charge ?
 - You want cost savings.
 - The utility doesn't seem to be able to respond as fast as you want.
 - You have several moderately sized motors that start periodically.
 - You also have a computer system used for billing and you need it to be available all the time.

For This Example, What Happens When The Motor Starts And You Are Not Connected To the Grid ?



If You Are Grid Connected



As An Option You Could Remain Stand Alone But Add Active Correction Device

